

Atomic Structure and Periodicity (Overview)

Before exploring the subtopics, understand that atomic structure and periodicity lay the foundation for understanding chemical properties and behavior.

Week 1 Topics:

1. Redox
2. Oxidation
3. Electro-chemical cells
4. Faraday's law of electrolysis
5. Corrosion and prevention

Let's break down each topic:

1. Redox (Reduction-Oxidation)

Redox reactions involve the transfer of electrons between atoms/molecules.

Key concepts:

- Oxidation: Loss of electrons (increase in oxidation number)
- Reduction: Gain of electrons (decrease in oxidation number)
- Oxidizing agent: Accepts electrons
- Reducing agent: Donates electrons

Example: $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$ (Sodium loses electrons, Chlorine gains electrons)

2. Oxidation

Oxidation is the loss of electrons, resulting in an increase in oxidation number.

Key concepts:

- Oxidation number: Charge on an atom in a compound
- Oxidation states: Different oxidation numbers an element can exhibit

Example: $2\text{Fe} + \text{O}_2 \rightarrow 2\text{FeO}$ (Iron oxidized from 0 to +2)

3. Electro-chemical cells

Electrochemical cells convert chemical energy into electrical energy.

Key concepts:

- Electrolyte: Conducting solution
- Anode: Oxidation occurs (–)
- Cathode: Reduction occurs (+)
- Electrode potential: Measure of electrode's tendency to lose/gain electrons

Example: Galvanic cell (Battery)

54. Faraday's law of electrolysis

Faraday's laws relate the amount of substance deposited during electrolysis to electric charge.

Key concepts:

- First law: Mass deposited $\propto$ Charge passed
- Second law: Mass deposited $\propto$ Molar mass/Electrochemical equivalent

Example: Electroplating (depositing metal ions onto a surface)

5. Corrosion and prevention

Corrosion is the degradation of materials due to chemical reactions.

Key concepts:

- Types: Chemical, Electrochemical, Biological
- Prevention methods: Coating, Cathodic protection, Passivation

Example: Rusting of iron ($\text{Fe} \rightarrow \text{Fe}_2\text{O}_3$)